Perception and labor supply: a theoretical analysis with an application to immigrants*

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Abstract

We postulate that if a worker cares about how he is perceived at work, this will affect his effort. He will exert more effort "today" in order to gain a more favorable perception (or reputation) but might reduce effort later, given that he now has a good reputation. We find that a worker who cares about his reputation might have a down-sloping labor supply curve. We argue that immigrants care more about their reputation at work than natives. Given that concern for one's reputation affects effort and that immigrants and natives care differently about their reputation at the work, we would expect differences in the efforts of immigrants and natives. We show that immigrants work harder than natives when they enter the labor force, but overtime they reduce their labor supply by a bigger amount than natives, although they do not necessarily work fewer hours than natives. Our analysis also sheds some light on the catching-up or assimilation hypothesis in the immigration literature. Finally, we argue that government-funded programs intended to educate natives about immigrants and immigration could result in an increase in output.

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1. Introduction

Most people will agree that perception matters. Indeed, some will even claim that perception is everything. In this paper, we examine the labor supply behavior of agents who care about how they are perceived in the workplace. We then apply our analysis to immigrants.

We postulate that if a worker cares about how he is perceived by his fellow workers, superiors, and employer, this will affect his effort. He will exert more effort "today" in order to get a more favorable perception (or reputation) but might reduce effort later, given that he now has a good reputation. We argue that immigrants care more about their reputation at the work place than natives. For example, negative stereotypes may put more pressure on immigrants to prove themselves. Given that concern for one's reputation affects effort and that immigrants and natives care differently about their reputation at the work, we would expect differences in the efforts of immigrants and natives. In what follows, we show this formally.

Our model is very much in the spirit of Akerlof (1980). In his model, the perception of one's peers influences a person's decision to obey a social norm. Also Kandel and Lazear (1992) examine a model in which agents in a partnership do not shirk because they do not want to incur the displeasure of their peers. Piketty (1998) examines a model in which agents care about being viewed as "smart". He defines social status as public beliefs about one's smartness. Social status, in his model, is positively related to one's economic success. As in our case, concern for this social status has an effect on an agent's motivation (effort) to succeed. Also, social psychologists and sociologists have, for a long time, emphasized the idea that human beings are social beings. On a more general note, one may interpret the behavior of the workers in our model as an attempt to improve upon their self-esteem (Hoyle et. al, 1999).

The paper is organized as follows. The next section presents the model and discusses our results. Section 3 concludes the paper.

2. The model

Assume that an agent has the utility function, $U(C, R, \theta) = u(C) + \theta R$, where C is consumption, R is reputation and $\theta > 0$ is a parameter which represents the agent's taste for his reputation. This follows Akerlof (1980). However, we abstract from strategic issues by assuming that the reputation of an agent has no effect on the reputation of others and vice versa. We shall discuss this assumption later.

Without any loss of generality, assume that $u(C) = C$. Let e be the worker's labor supply and y his output. We assume that workers do not shirk or that shirking can be costlessly detected.

We use labor supply and effort inter-changeably. We treat the wage rate as exogenous. We shall discuss this assumption later.

Consider a two-period model. Assume that a worker's reputation is increasing in the total output produced over his working life. He gains more respect, the more contribution he is perceived to have made. Hence, his reputation is increasing in his aggregate output. So in period 1, $R_1 = R_1(y_1)$ but in period 2, $R_2 = R_2(y_1 + y_2)$. Since output is increasing in effort, e_i, we can write, at the risk of notational abuse, $R_1 = R_1(e_1)$ and $R_2 = R_2(e_1 + e_2)$, where e_i is the effort in period i.[1] Assume that R is increasing and strictly concave. We assume that R is not separable [i.e., $R_2 \neq R_1(e_1) + R_2(e_2)$].

Let w_1 and w_2 be the wage in periods 1 and 2 respectively. Since there is no saving in this model, $C_i = w_i e_i$. We solve the worker's problem backwards. In period 2, he chooses e_2 to maximize $w_2 e_2 + \theta R_2(e_1 + e_2) - c(e_2)$, where $c(e)$, cost of supplying labor, is increasing and strictly convex. Note that e_1 is fixed in period 2. The FOC for this is

$$w_2 + \theta R_2'(e_1 + e_2) - c'(e_2) = 0 \tag{2}$$

The solution to this problem is $e_2^* = e_2^*(w_2, e_1, \theta)$. Putting this into (2) and taking the derivative with respect to e_1, we get

$$\frac{\partial e_2^*}{\partial e_1} = \frac{\theta R''(\cdot)}{c''(\cdot) - \theta R''(\cdot)} < 0, \tag{3}$$

since R is increasing and strictly concave and c is increasing and strictly convex.

Note that if the agent does not care about his reputation and $w_1 = w_2$, then $e_1 = e_2$. We shall now argue that if the agent cares about reputation, then the equilibrium labor supply may fall in period 2, even if and $w_1 \leq w_2$. This result comes directly from the comparative static result in (3). Since e_1 inversely affects e_2, it is possible that e_1 is sufficiently large such that $e_2 < e_1$. What is surprising about this result is that it would not arise if the agent does not care about his reputation. This means that reputation may well be an important factor in labor supply decisions. We shall show this result much more explicitly in section 2.1. For now, we state the following proposition:

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[1] Note that there different ways in which a worker might try to improve upon his reputation. Some of these investments in reputation might be socially wasteful. For example, he might spend his time "pretending" to be working when he is not actually working. He might also over-invest in formal education. We assume that the investment in reputation only takes the form of effort at the work place (which increases output).

Proposition 1: *The equilibrium labor supply in period 2 may be lower than the supply in period 1, if the worker cares about his reputation, even if the wage rate in period 1 is greater than or equal to the wage rate in period 2.*

The worker might work harder in period 1 in the hope of getting a higher wage in period 2. This could arise if the worker is paid as a low-type when he is actually a high-type. To signal his type he might work harder. In our model, the individual works harder not for any monetary gain but instead for a psychic gain.

From proposition 1, we get the following corollary:

Corollary: *If the worker cares about his reputation, then he might reduce his labor supply if the wage rate goes up (i.e., down-sloping labor supply curve).*

In period 1, the worker chooses e_1 to maximize his life-time utility,

$$\Sigma U = w_1 e_1 + \theta R_1(e_1) - c(e_1) + w_2 e_2^*(w_2, e_1, \theta) + \theta R_2(e_1 + e_2^*(w_2, e_1, \theta)) - c(e_2^*(w_2, e_1, \theta))$$

(4)

The FOC for this problem is

$$w_1 + \theta R_1'(e_1) - c'(e_1) + w_2 \frac{\partial e_2^*}{\partial e_1} + \theta\left(1 + \frac{\partial e_2^*}{\partial e_1}\right) R_2'(e_1 + e_2) - \frac{\partial e_2^*}{\partial e_1} c'(e_2) = 0 \qquad (5)$$

Let the solution be $e_1^*(w_1, w_2, \theta)$. Note that without the concern for reputation, e_1 will not affect e_2. So in that case, when we choose e_1 to maximize (4), the last three terms will drop out, and the problem is then equivalent to maximizing only period 1 utility.[2] This is the reasoning behind proposition 1. To find the effect of θ on $e_1^*(w_1, w_2, \theta)$, we need to differentiate (5) with respect to θ. To sign $\partial e_1^*(w_1, w_2, \theta)/\partial\theta$, we need to determine the sign and magnitude of the cross partial, $\dfrac{\partial}{\partial\theta}\left(\dfrac{\partial e_2^*}{\partial e_1}\right)$; the sign is ambiguous. This makes it difficult to sign $\partial e_1^*(w_1, w_2, \theta)/\partial\theta$. In next section, we present a specific example which shows that it is positive.

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[2] Alternatively, set $\theta = 0$ and $\partial e_2^*/\partial e_1 = 0$ in (5) and the result is the FOC for maximizing only period 1 utility.

Now put $e_2^* = e_2^*(w_2, e_1^*, \theta)$ into equation (2) and differentiate with respect to θ to get

$$\frac{\partial e_2^*}{\partial \theta} = \frac{R'(\cdot)}{c''(\cdot) - \theta R''(\cdot)} > 0, \tag{6}$$

Equation (6) implies that the higher is the worker's concern for reputation the higher is his effort in period 2 *holding his effort in period 1 fixed*. If $\partial e_1^*(w_1, w_2, \theta) / \partial \theta > 0$, then a worker with a higher θ will worker harder in period 1 than a worker with lower θ. However, if we take into account the fact that e_1 is a function of θ, then

$\partial e_2^* / \partial \theta = \partial e_2^* / \partial \theta + (\partial e_2^* / \partial e_1)(\partial e_1^* / \partial \theta)$ has an ambiguous sign. This is because $\partial e_2^* / \partial \theta > 0$, $\partial e_2^* / \partial e_1 < 0$ and $\partial e_1^* / \partial \theta$ has an ambiguous sign.

Let us now provide some intuition for why $\partial e_2^* / \partial \theta$ and $\partial e_1^* / \partial \theta$ have ambiguous signs. Note that an increase in θ increases effort in both periods, holding all else constant. However, if the worker knows that his effort in period 2 will increase and thus his reputation will increase, holding period 1 effort constant, then he might reduce his effort in period 1, if the effect of the increase in θ on his period 2 effort and hence on his reputation is sufficiently weak. The reduction in his period 1 effort will cause him to exert more effort in period 2. On the other hand he might increase his period 1 effort if the effect of the increase in θ on his period 2 effort and hence on his reputation is sufficiently strong. This explains why $\partial e_1^* / \partial \theta$ has an ambiguous sign. A similar reasoning applies to $\partial e_2^* / \partial \theta$.

Note that we have assumed that w_1 and w_2 are exogenous. This assumption makes sense if what we are interested is the worker's labor supply function. Hence this assumption does not affect the propositions above. However, if we are also interested in the labor supplied by the worker in equilibrium, then we have to consider the firm's demand for labor. Besides this assumption simplifies the analysis and enables us to focus on the effect of a concern for reputation on labor supply.

2.1 *An example*

We present an example of our analysis. Suppose $c(e) = e^2$, $R_1(e_1) = \theta \ln e_1$, $R_2(e_1 + e_2) = \theta \ln(e_1 + e_2)$, and $w_1 = w_2 = 0.5$. Since $w_1 = w_2$, labor supply would be the same in both periods if there were no concern for reputation. We now show that in the presence of a concern for reputation, labor supply will differ in both periods and in particular it will be higher in period 1.

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Suppose $\theta = 0.1$. We find that $e_2^* = e_2^*(w_2, e_1^*, \theta)$ has two roots.[3] One root is negative and the other is positive. We ignore the negative root. The positive root is

$$e_2^* = 0.125 - 0.5e_1 + 0.025\sqrt{105 + 200e_1 + 400(e_1)^2}$$. When we solve the model in period 1, we

get $e_1^* = 0.4328.$[4] This gives $e_2^* = 0.3167$.

Now suppose $\theta = 0.2$, $e_2^* = 0.125 - 0.5e_1 + 0.025\sqrt{185 + 200e_1 + 400(e_1)^2}$. We then

get $e_1^* = 0.5443$ and $e_2^* = 0.3605$. It is then easy to see that in both cases

$\Delta \equiv e_1^* - e_2^* > 0$. Also $\partial\Delta/\partial\theta > 0$, $\partial e_2^*/\partial\theta > 0$, and $\partial e_1^*/\partial\theta > 0$. It follows that in both periods the labor supply is higher when $\theta = 0.2$, although the reduction in labor supply is also bigger.

Note that $\partial\Delta/\partial\theta > 0$ means that in period 2, a worker with a higher θ may reduce his work effort by a bigger amount, Δ, than a worker with a lower θ. This gives the following proposition.

Proposition 2: *The more the worker cares about his reputation, the bigger is the reduction in his labor supply in the future.*[5]

Now consider $\theta = 0.1$ and set $w_1 = 0.5$, $w_2 = 0.6$. Then $e_1^* = 0.43005$ and $e_2^* = 0.37432$. Hence the worker reduces his labor supply in period 2 although the wage is higher. This example confirms corollary 2.

Suppose $\theta = 0$ for natives and set $w_1 = 0.75$, $w_2 = 0.75$. Then $e_1^* = 0.375$ and

$e_2^* = 0.375$. Hence in period 1, the native worker's income is $w_1 e_1^* = 0.2813$ and in period 2, it is

also $w_2 e_2^* = 0.2813$. For immigrants, let $\theta = 0.2$, $w_1 = 0.5$, $w_2 = 0.5$ as above. Note that natives are paid more than immigrants in both periods. Then using the results above for $\theta = 0.2$, $w_1 = 0.5$, $w_2 = 0.5$, the earnings of immigrants in period 1 is 0.2721 and in period 2, it is 0.1803. Note that the gap between the earnings of natives and immigrants *widens* in period 2. This gives the following proposition:

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[3] These were obtained using the math software, MAPLE V Release 5.1.
[4] We also check that second-order conditions for a local maximum hold.
[5] Since we used an example to show this result, we recognize that the wording of this proposition is stronger than it should be.

Proposition 3: *If immigrants care more about their reputation than natives then there might be no catching up between the earnings of immigrants and natives.*

This proposition follows directly from the result that immigrants might reduce their effort by a bigger amount than natives in period 2.

2.2 Discussion

The higher is θ the more the person cares about his reputation. We argue that immigrants care more about how they are perceived at work than natives. In our framework, this translates into a bigger concern for reputation. We have shown that this will result in immigrants having a higher labor supply than natives. However, over time, the *stronger* reputation effect results in a bigger reduction in labor supply of immigrants than the reduction in the labor supply of natives later in their working lives. Note that this does *not* mean that eventually immigrants work for fewer hours than natives. It only means that immigrants will reduce their labor supply by a bigger amount relative to their *own* previous labor supply. That is, we do not compare the working hours of immigrants and natives. We compare the *change* in working hours and claim that this change is bigger for immigrants than for natives.

Our result sheds some light on the assimilation or catching-up hypothesis in the immigration literature [Chiswick (1978), Borjas (1985)]. *Even if* immigrants catch up to natives it might be due to the fact that they work harder. But catching-up does not necessarily imply the absence of discrimination in the labor market. Indeed, a concern for reputation might result in no catching-up, since immigrants might slack over time.

We have assumed that the reputation of one worker has no effect on the reputation of other workers. This may not necessarily be the case. For example, it is possible for the reputation of earlier immigrants at the work place to have a positive effect on the reputation of current immigrants or for immigrants concurrently working at the same place to exert positive "reputational" effects on each other. To the extent that reputation in this case is a public good or exerts a positive externality, each immigrant worker will reduce his effort than in the case with no externalities.[6] However, it would not change our conclusion that labor supply is higher when reputation matters than when it does not. Nor will it change our result that the labor supply in

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[6] Note, however, that this might not be the case in both periods. Consider period 2. In a Nash equilibrium, we would expect each worker to reduce his effort compared to the case with no positive externality. But since the workers know that effort in period 2 will be lower, they might exert more effort in period 1.

future will be lower. However, it might change our result that immigrants will work harder than natives because they have a higher θ.

It is obvious that there are other factors which can explain why a worker will reduce his labor supply in the future. For example, a worker with a target goal (i.e., target income, target savings, etc), might reduce his labor supply when this target is achieved. There is, however, a difference between this explanation and ours. In the "target goal" case, the worker reduces his labor supply when the preference for the target no longer exists. This will be similar to our case when the concern for reputation no longer exists (i.e., θ = 0 in period 2). However, our result does not hinge on this assumption because the worker reduces his labor supply even if he still cares about his reputation in period 2. Our result hinges on the assumption that there is diminishing returns to investment in reputation (i.e., $R'' < 0$) and the assumption that R(e$_1$+ e$_2$) is not separable.

3. Conclusion

The result that a worker who cares more about his reputation will work harder (initially) than a worker who has a relatively small concern for his reputation is *probably* not surprising. What is surprising and hence not obvious is that the worker who cares more about reputation may reduce his labor supply by a bigger amount. It is this latter proposition (i.e., proposition 2) which will be the challenge for future empirical research. Indeed, this result implies that groups which are discriminated against might experience a bigger reduction in their drive and motivation in future. The analysis also implies that over time the gap between the labor supply of immigrants (or the group discriminated against) and natives (the favored group) should narrow.

It is important to note that for our results to hold a worker must care about how he is perceived *and* it must be possible to manipulate that perception by working harder. If the worker's hard work is not recognized, then he will have no incentive to work harder and hence our results will not hold. This has an interesting policy implication. Investment of resources by governments to educate and improve their citizen's understanding about immigrants and immigration issues might pay off. This is because immigrants would have the incentive to work harder and contribute more to output since the government's education will give them the hope that they can change negative perceptions about them by working harder. Of course, one might argue that the government's education might lead to a situation where immigrants would not care about their reputation anymore (i.e., a lower θ) since natives perceive them more favorably. This would result in a lower output. We do not think that the government's policy would have this effect. This is because we see the government's educational program as a necessary but *not* sufficient condition for natives to have a favorable perception of immigrants. What the

government's policy does is to help natives to be open-minded towards immigrants. In other words, the education is intended to help natives appreciate the contribution of immigrants. However, the natives can only do so if immigrants actually contribute. Indeed to argue that the government's policy reduces θ is wrong. What the policy does instead is to change the R function. Note that R measures how an immigrant's reputation increases with a given increase in effort. Think of R as $R_T = R_T(\sum\limits_{t=1}^{T} e_t , \gamma)$, where γ is a shift parameter and T = 1, 2. The government's policy increases R by increasing γ, for any given effort. Thus, the more open-minded natives are about immigrants, the higher is R for a given e. This increase in reputation will cause immigrants to work harder. To see this, suppose $R_T = R_T(\sum\limits_{t=1}^{T} e_t , \gamma) = \gamma(\sum\limits_{t=1}^{T} e_t)$. Then $\theta R_T = \hat{\theta}(\sum\limits_{t=1}^{T} e_t)$, where $\hat{\theta} \equiv \theta\gamma$. It follows that increasing γ has the same effect as increasing θ in our analysis above. Hence government-funded programs intended to educate natives about immigrants and immigration could result in an increase in output.

We have chosen specific examples to show our results. This may be a weakness of our paper. In any case, we hope that this theoretical piece has drawn attention to the importance of "concern for reputation" in labor supply decisions.

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